INSTRUCTION BOOK
and
OPERATING MANUAL

CITI-FONE SS

LICENSE REQUIREMENTS

Federal Communications Commission form 505 must be filled out and submitted to the Commission at Washington, D.C., to obtain the station and operators license necessary for the operation of this equipment.

Obtain and read Part 95 of the F.C.C. rules and regulations before filling out form 505 for your license. A copy of Part 95 may be obtained from the Superintendent of Documents, Government Printing Office, Washington 25, D.C.

Before operating this equipment you must obtain and have in your possession, your station license with assigned call numbers issued by the F.C.C. and a copy of Part 95 of the rules and regulations. Failure to comply with the Commission's rules and regulations is a Federal offense.

Any adjustments or repairs concerned with the frequency controlling circuits and/or transmitter crystals of this equipment must be made only by persons having in their possession a valid First or Second Class Radiotelegraph or Radiotelephone license issued by the Federal Communications Commission.

CERTIFICATION

The Multi-Elmac Company of Oak Park, Michigan certifies that all Citi-Fones meet the F.C.C. requirements under Part 95 of the Commissions rules and regulations regarding frequency tolerance, stability, modulation, power input, and harmonic radiation.

MULTI-ELMAC COMPANY
OAK PARK, MICHIGAN 48237

FORM #M200-R-964

LITHO IN U.S.A.

YOUR CITI-FONE SS IS DESIGNED FOR FLEXIBILITY, IS RUGGEDLY CONSTRUCTED AND INCORPORATES THE LATEST PROVEN TECHNIQUES IN THE ART OF TWO-WAY RADIO COMMUNICATION.

TO INSURE OPTIMUM PERFORMANCE AND MATCHING TO YOUR ANTENNA INSTALLATION; THE SECTIONS UNDER "OPERATION" SHOULD BE CAREFULLY OBSERVED PRIOR TO OPERATION OF THE "CITI-FONE".

CITI-FONE SS/6 or CITI-FONE SS/12

SPECIFICATIONS

RECEIVER: Superheterodyne, crystal controlled, with tuned R.F. amplifier and two (2) I.F. amplifiers. Sensitivity: 0.5 microvolts for 10:1 S+N/N ratio. Selectivity: 6DB down for 7 Kc. total bandpass and 40 DB down for 20 Kc. total bandpass. Delayed AVC. Noise Limiter: Automatic series gate type. Squelch: Noise-immune type wih sensitivity 0.1 microvolts above threshold noise level to completely open squelch. Audio Output: 2 watts with less than 10% harmonic distortion. Panel Meter: "S" meter in receive mode, S9 equals 50 microvolts R.F. signal input.

TRANSMITTER: 5 watts input (FCC Maximum). Modulation: High level plate modulation. Output Circuit: PI network for 50 ohm line. Panel Meter: Relative R.F. output indicator in the transmit mode.

POWER SUPPLY: Dual purpose for operation from D.C. source or A.C. source. Power supply is the voltage doubler type and uses silicon diode rectifiers.

GENERAL: The MULTI-ELMAC COMPANY "Citi-Fone" SS is a combination receiver, transmitter and dual purpose power supply fabricated into a single enclosure. The equipment is designed for low power two-way radio communication in the Class "D" Citizens-band of frequencies.

The Citi-Fone SS incorporates 23 channel crystal controlled transmit and receive operation. Crystal synthesis techniques are used to derive the 23 transmit and 23 receive channels with the use of eleven crystals for complete coverage of the Class "D" Citizens Radio Service.

Distance of communication over which these units are effective depends upon terrain, local noise conditions, type of antennas used and quality of antenna installation.

The Citi-Fone SS is designed for use with most commercially available antennas. Specific antenna types, location and installation information should be obtained from your CB dealer.

POWER REQUIREMENTS:
Transmit: 6 volts DC at 8 amperes, 12 volts DC at 4 amperes, or 115 volts AC at 48 watts intermittent.
Receive: 6 volts DC at 6.4 amperes, 12 volts DC at 3.2 amperes, or 115 volts AC at 38 watts continuous.

FREQUENCY COVERAGE: Single control, twenty-three (23) channel crystal controlled transmit and receive operation covering 26.965 Mc. to 27.255 Mc. Class "D" frequencies.

FEATURES: Single panel control for 23 channel selection with illuminated channel indicator. Illuminated panel "S" meter and relative R.F. output indicator. Noise-immune squelch. Delayed AVC. Receiver adjustable ±3 Kc. from center channel frequency. Automatic series gate type noise limiter. Microphone with retractable coiled cord and quick disconnect plug. A.C. and D.C. operation.

EQUIPMENT SUPPLIED: One Citi-Fone SS/6 or Citi-Fone SS/12 ready to operate with all crystals for 23 channel operation, microphone and hanger, A.C. and D.C. power cords, mounting bracket and hardware.

TUBE COMPLEMENT

V-1	6DK6	receiver R.F. Amplifier pentode	
V-2 a	6EA8	receiver second mixer pentode	
b	6EA8	receiver-transmitter crystal oscillator triode	
V-3	6BJ6	receiver 1st IF amplifier	
V-4	6BJ6	receiver 2nd IF amplifier	
V-5	6AL5	receiver Detector, A.N.L., and A.V.C.	
V-6	6EJ7	receiver 1st Audio amplifer, squelch controlled; transmitter microphone pre-amplifier	
V-7 a	6GW8	receiver audio output amplifier	pentode
		transmitter modulator	pentode
V-7 b	6GW8	squelch control tube	triode
V-8 a	6BH8	transmitter crystal oscillator	triode
V-8 b	6BH8	transmitter R.F. driver	pentode
V-9	6AQ5	transmitter R.F. final amplifier	
V-10 a	6EA8	receiver variable oscillator	triode
V-10 b	6EA8	receiver-transmitter mixer	pentode

SEMI-CONDUCTOR COMPLEMENT

D-1	DR1520	Delayed AVC detector
D-2	1N34	R.F. output detector
D-3, D-4	VB-500	Power supply rectifiers

CLASS "D" CITIZENS-BAND CHANNELS AND FREQUENCY:

Channel Number	Frequency	Channel Number	Frequency
1	26.965 Mc.	13	27.115 Mc.
2	26.975 Mc.	14	27.125 Mc.
3	26.985 Mc.	15	27.135 Mc.
4	27.005 Mc.	16	27.155 Mc.
5	27.015 Mc.	17	27.165 Mc.
6	27.025 Mc.	18	27.175 Mc.
7	27.035 Mc.	19	27.185 Mc.
8	27.055 Mc.	20	27.205 Mc.
9	27.065 Mc.	21	27.215 Mc.
10	27.075 Mc.	22	27.225 Mc.
11	27.085 Mc.	23	27.255 Mc.
12	27.105 Mc.		

INSTALLATION

GENERAL: The Citi-Fone SS is completely wired, has all tubes in place, all crystals installed and is ready for operation as it leaves the factory. However, the appropriate power cord has to be connected between the Citi-Fone and the power source, and a suitable antenna system must be provided.

Best results will be realized if the installation is performed by competent, qualified persons. It is recommended that the tuning of the Citi-Fone SS be checked at the installation, to insure optimum output and efficiency. Tuning adjustments are covered under "SIGNAL STRENGTH METER."

One of the power cords supplied is for either 6 or 12 volts DC operation. Be sure that the battery voltage of the vehicle is the same as that of the Citi-Fone. The voltage that the Citi-Fone is wired for is stamped on the rear of the cabinet. The other cord supplied is for 115 volts AC operation. This cord is easily identified by the standard 115 volt plug attached to one end. To convert from AC to DC operation simply exchange cords. For permanent DC installation it is recommended that the power cord be wired direct to the battery. Since a longer wire is normally required, it is recommended that a heavier gauge wire be used. Be certain the power cord is wired properly if the plug is removed.

MOUNTING: The handle affixed to the Citi-Fone also serves as a mounting bracket. For mobile installations the handle is easily secured to the bottom of the vehicle dash-board. There are two holes provided in the handle for this purpose. The handle may be removed from the cabinet by removing the knurled thumb screws in the side of the cabinet. When used at a fixed or base station the handle can be rotated so it is under the Citi-Fone to act as a support to hold the unit in an inclined position.

ANTENNA: The antenna system is very important and can make the difference between a successful and poor two-way radio communication system. Most efficient communications will result when the antenna is a 52 ohm impedance at resonance and 52 ohm transmission line is used for lead-in. An adapter, (G.C. #29-782), is supplied to adapt the type PL-259 co-ax plug to the Citi-Fone antenna jack.

NOISE: Normally, noise should not be a problem in the Citi-Fone. However, in mobile installations, it is not uncommon to experience trouble due to ignition noise, generator and voltage regulator hash, or wheel and tire static generated by the vehicle. The disturbing effect created by these sources can be practically eliminated by the proper use of noise suppressors, by-pass capacitors, front wheel static collectors, and if necessary, anti-static powder can be inserted into the tires through the valve stems.

OPERATION

When the Citi-Fone is properly installed actual operation is quite simple and should not present any problems.

VOLUME CONTROL AND SWITCH: The Citi-Fone is turned on by rotating the volume control knob, located in the lower left of the control panel, in a clockwise direction until a click is heard. Continuing the rotating of this knob in a clockwise direction will increase the volume level of the received signal.

SQUELCH CONTROL: This control, located to the right and below the channel selector, is used to quiet the receiver when there is no actual RF signal on the air. It is imperative that the operator understands the proper operation of this control. There is no impairment to the reception of messages, including those from very weak stations, when this control is properly adjusted. Adjust as follows: set the volume control to a comfortable listening level with the squelch control counterclockwise. At a time when there is no signal on the air, advance the control to the point where the receiver becomes quiet. DO NOT ADVANCE THE CONTROL MORE THAN ABOUT 5 DEGREES BEYOND THIS POINT. Advancing of the squelch control beyond this point of quieting will result in the necessity of the transmitted signal from a distant location to be closer or stronger to open the squelched receiver. This fact is of particular importance when operating a mobile unit, since the vehicle will be traveling to areas of various noise levels. It is advisable that the operators of mobile units be made aware of the proper operation of the "Squelch" control, so that maximum range may be realized in the two-way communications system.

CHANNEL SELECTOR: The channel selector switch is located at the top center of the control panel. This switch selects any one of twenty-three pre-set channel frequencies. Both transmitting and receiving channels are selected simultaneously by this control. Remember, any station with which you wish to communicate must be on the same frequency as your Citi-Fone.

TUNE CONTROL: The control is mounted on the front panel and is used to adjust the receiver plus or minus 3 kilocycles from the center of the channel frequency. Normally, this control is left with the marker set at the zero position. To facilitate reception of a station operating slightly off the received center frequency the tune control can be adjusted in either direction.

SIGNAL STRENGTH METER: The panel mounted meter gives a visual indication of the strength of the signal being received. The meter is calibrated in "S" units to S9. The S9 reading indicates a signal strength of 50 microvolts at the antenna terminal. Stronger signals will indicate to as high as the 40 DB mark depending on the strength of the signal.

When transmitting, the meter is automatically switched and registers the relative power output of the transmitter.

The readings on the meter can be used to adjust the Citi-Fone receiver and transmitter sections to the antenna for optimum performance.

The two adjustments, one for receiving and one for transmitting, are accessible through the holes in the bottom of the enclosure.

To peak the Citi-Fone on receiving, locate the #603 T1 coil with reference to drawing #1077. Tune in a steady, non fading, signal in the center of the tuning range between channels 8 and 16. With the aid of a GC 8606, or similar, hex alignment tool, adjust the core of the #603 coil for maximum "S" meter reading.

The transmitter section is peaked to the antenna by adjusting L5. Select a transmit channel preferably near the center of the Citizens-band. Press the push-to-talk microphone switch and carefully adjust L5 for maximum meter reading.

> NOTE A peak reading of the meter will correspond to maximum transmitter output only when the feed line impedance is flat or correctly terminated to the antenna. The final adjustment to L5 should always be accomplished with the aid of a Field Strength Meter.
>
> METER ZERO-SET: Occasionally, after a tube change or after several hundred hours of operation, it may become necessary to reset the meter pointer to the zero mark on the meter scale.
>
> The adjustment for zeroing the meter is accessible through the hole in the left side of the enclosure. For location refer to drawing #1077.
>
> Allow the Citi-Fone to warm up for a few minutes. Disconnect the antenna lead. With a small screwdriver, turn the adjustment in either direction until the meter pointer rests on zero. When the antenna is connected, the meter will normally read partly upscale due to antenna and other extraneous noise.

MICROPHONE: The microphone and the push-to-talk switch located on the side of the microphone are all that have to be operated after the volume control, squelch, and channel selector adjustments have been made.

To talk to another station merely press the button on the side of the microphone and speak into the microphone. Best results will be obtained when speaking in a normal voice with the microphone held about four inches from your lips and at a slight angle. Do not allow air to pass directly into the microphone when you are speaking as this will cause a rushing or whistling noise to be heard at the receiving end of the two-way installation. Do not shout into the microphone as this will cause distortion in the transmitted speech and make it very difficult for the other party to understand you.

REMEMBER: The button on the microphone must be pressed when you wish to speak and must be released to listen.

MAINTENANCE

The Citi-Fone should provide years of reliable operation with a minimum amount of service. The entire circuit has been designed in such a manner that no components are working near their maximum ratings.

ONCE A YEAR PREVENTIVE MAINTENANCE CHECKUP IS STRONGLY RECOMMENDED.

A once a year checkup will insure that the Citi-Fone SS is functioning properly and allow the service technician to find troubles before they create damage that could result in costly repairs. Also, transmit crystals can be checked to insure on frequency operation. The individual owner of the equipment is responsible for the frequency of the transmitter according to FCC rules. However, only those persons having a valid first or second class radio telephone operators license are qualified to service the frequency determining portions of any Citizen's Band equipment.

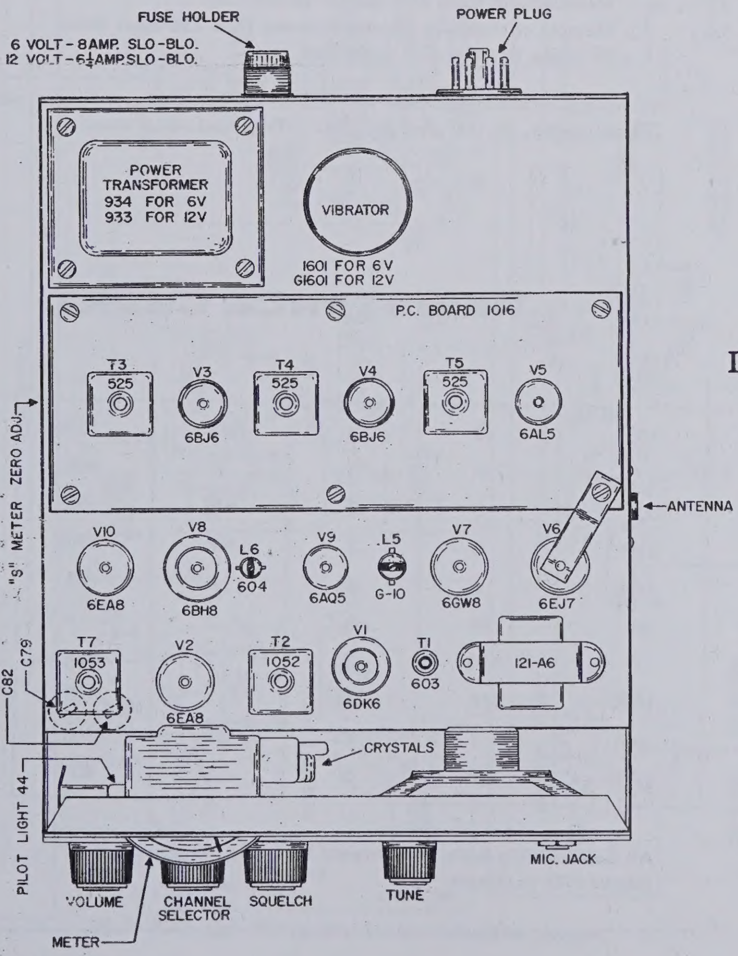
In the event it is deemed necessary to return the equipment to the factory for service it must be done in the following manner. First: Obtain authorization from the factory. Instructions will then be forwarded as to how and where the equipment is to be returned. Always specify the name of the equipment, the model number, serial number, and the nature of the complaint in any correspondence regarding your unit.

Most component parts used in the Citi-Fone are standard and readily available at the nearest electronic supply house. Any special components can be obtained from the factory by submitting information regarding part description, circuit location and model number.

AMPEREX TUBES ARE RECOMMENDED FOR REPLACEMENT OF THE 6EJ7 and 6GW8 TUBES.

CAUTION: In the event it becomes necessary to convert the Citi-Fone from a 6 volt D.C. unit to a 12 volt D.C. unit the following items must be changed.

1. Change the vibrator. #1601 is for 6 volts, #G1601 is for 12 volts.
2. Change the filament connections as shown on the schematic diagram.
3. Change the power transformer. #934 is for 6 volts.
   #933 is for 12 volts.
4. Change the fuse. 8 ampere slo-blo for 6 volt.
   6.25 ampere slo-blo for 12 volt.
5. Indicate this change on the rear of the cabinet.



DRWG. #1077

VOLTAGE CHART

Pin #	1	2	3	4	5	6	7	8	9
V1	DAVC	.9	6 ac	12 ac	220	82	0	-	-
V2T	120	0	0	0	6 ac	0	.14	0	-5.5
V2R	120	0	167	0	6 ac	205	4.7	0	-5.9
V3	AVC	1.6	0	6 ac	210	80	0	-	-
V4	AVC	1.7	0	6 ac	210	88	0	-	-
V5	0	-1.4	0	6 ac	0	0	-.08	-	-
V6T	.5	0	.5	0	6 ac	-	76	31	.5
V6R a	36	31 VTVM	36	0	6 ac	-	164	142	36
V6R b	38	-6.7	38	0	6 ac	-	216	186	38
V7T	-6.3	-4.5	233	6 ac	12 ac	205	6.3	0	0
V7R a	AVC	5.1	230	6 ac	12 ac	220	6.1	0	33 VTVM
V7R b	-16	-15	230	6 ac	12 ac	220	6.1	0	-6.9 VTVM
V8T	.07	-.02	138	12 ac	6 ac	2.7	0	184	226
V8R	0	-.75	0	12 ac	6 ac	0	-1.3	0	0
V9T	-2.5*	0	6 ac	12 ac	162	162 ‡	-2.5*	-	-
V9R	0	32	6 ac	12 ac	220	220	0	-	-
V10T	0	0	168	0	6 ac	197	5	0	-.1
V10R	152	0	168	0	6 ac	202	4.7	.06	-3.5

LINE VOLTAGE - 120vac
T - Transmit
R - Receive
Ra - Measurements made with squelch control CCW.
Rb - Measurements made with squelch control CW.
* - Measure at test point junction between 1K & 15K (16:1 ratio)
‡ - RF Choke in series with meter lead.

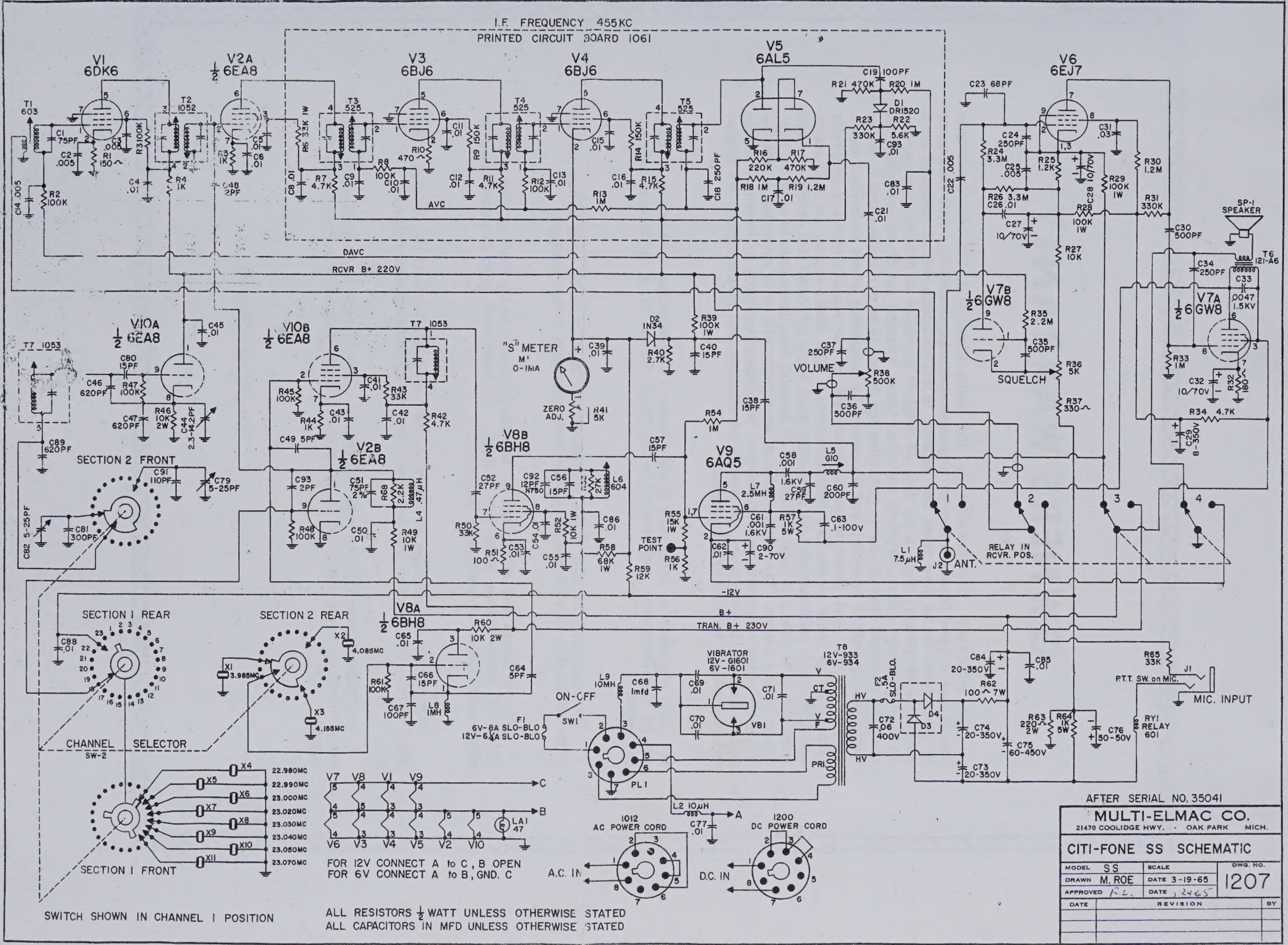
All voltage measurements made with respect to chassis using a Simpson model 270 multimeter, 20,000 ohms per volt. VTVM used where shown.

RESISTANCE CHART

Pin #	1	2	3	4	5	6	7	8	9
V1 6DK6	1.2M	150	.3	.3	35K	135K	0	-	-
V2 6EA8	44K	0	70K	0	.3	40K	1K	0	140K
V3 6BJ6	1.7M	500	0	.3	40K	190K	0	-	-
V4 6BJ6	160K	81K	0	.3	40K	190K	0	-	-
V5 6AL5	2.9M	440K	0	.25	0	0	350K	-	-
V6 6EJ7	12K	7M	12K	0	.3	-	370K	1.25M	12K
V7 6GW8	2.6M	†	35K	.3	.25	36K	180	1M	3.2M
V8 6BH8	18.5	100K	87K	.25	.3	100	34K	87K	76K
V9 6AQ5	15K	open	.3	.25	36K	36K	15K	-	-
V10 6EA8	46K	105K	70K	0	.3	40K	1K	18.5	105K

All measurements made, with respect to chassis, using a Simpson (Model 270) multimeter

† - Depends on squelch control setting, CW-550, CCW-2.5K



SWITCH SHOWN IN CHANNEL 1 POSITION

FOR 12V CONNECT A to C, B OPEN
FOR 6V CONNECT A to B, GND. C

ALL RESISTORS ½ WATT UNLESS OTHERWISE STATED
ALL CAPACITORS IN MFD UNLESS OTHERWISE STATED

AFTER SERIAL NO. 35041

MULTI-ELMAC CO.
21470 COOLIDGE HWY. · OAK PARK MICH.

CITI-FONE SS SCHEMATIC

MODEL SS	SCALE	DWG. NO. 1207
DRAWN M. ROE	DATE 3-19-65	
APPROVED R.L.	DATE 3-24-65	

DATE	REVISION	BY

OWNERS WARRANTY

All equipment manufactured by the Multi-Elmac Co. has been thoroughly tested and shipped from the factory in proper operating condition. This equipment is guaranteed to be free from any defects in workmanship and/or material for a period of 90 (ninety) days from date of original purchase as follows: Any part or accessory except tubes, crystals and other trade articles not of our manufacture, shall be replaced free of charge providing the defect is in our opinion due to faulty workmanship and/or material, and not caused by tampering, abuse or normal wear. Tubes, crystal and other trade articles not of our manufacture are generally guaranteed by their respective manufacturers. The Multi-Elmac Co. will act as agent of these manufactures in replacing such parts provided that such parts are returned to us pre-paid with a period of 90 (ninety) days from date of original purchase by the owner. The replacement of such parts will be in accordance with the warranty of the respective manufacturers. No further guarantee or warranty is implied. In accepting delivery, the purchaser assumes full responsibility for proper installation and service arrangements.

This warranty is valid only if the Owner's Registration Card has been filled out by the purchaser and mailed to the Multi-Elmac Co. at the time of original purchase.

This warranty is void if the equipment has been modified or if failure is due to the application of voltages other than those specified in this manual.

Do not return any equipment or accessory direct to the factory without first obtaining authorization from the factory. All equipment to be returned shall be shipped pre-paid and insured by the owner.

Any claims for damage or loss in transit must be filed with the carrier. The Multi-Elmac Co. will give any necessary assistance in filing such claims.

The Multi-Elmac Co. reserves the right to make changes in current production models without being obligated to incorporate such changes in earlier production models.

Multi-Elmac Company

OWNERS WARRANTY

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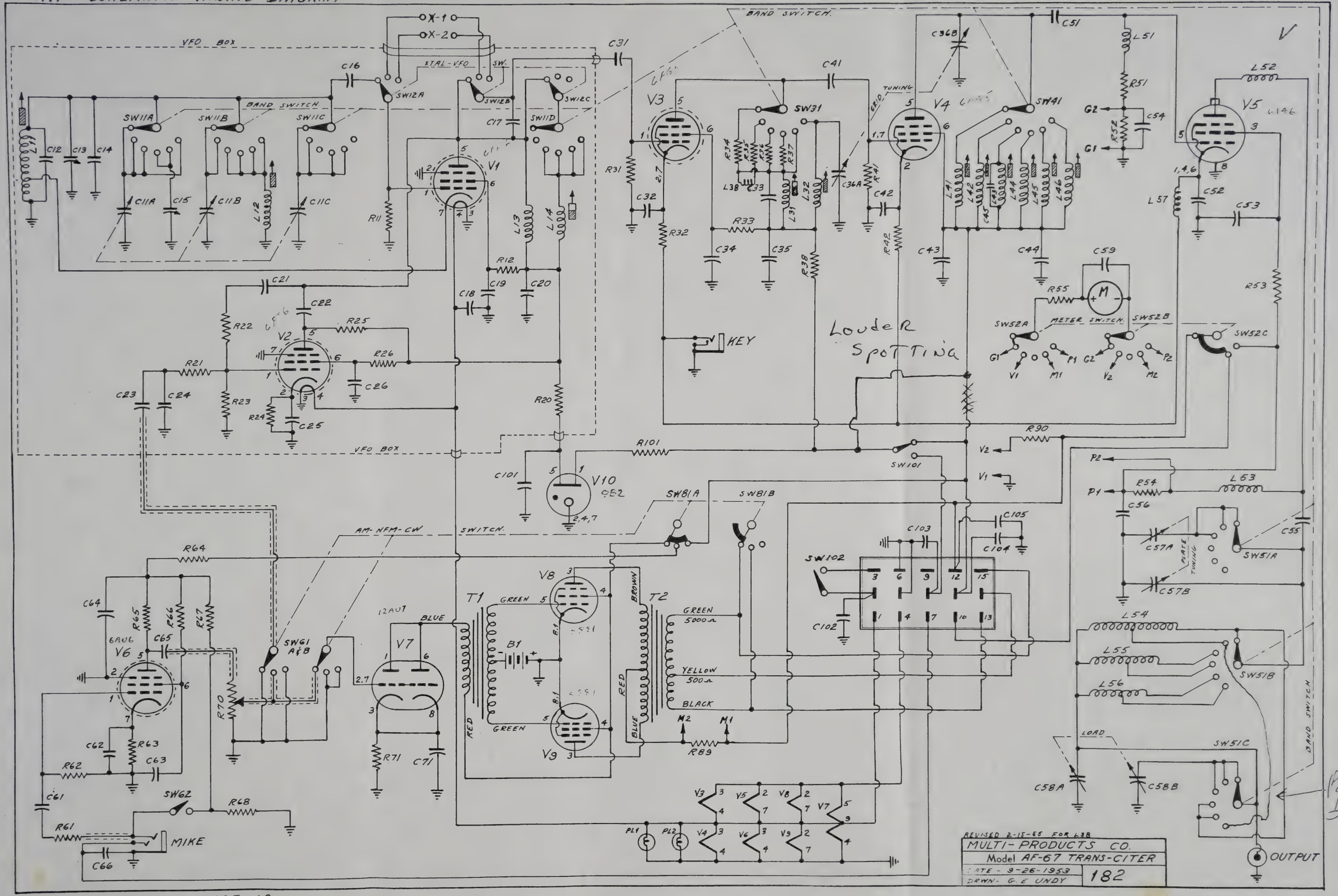
Multi-Elmac Company

4.7 - SCHEMATIC WIRING DIAGRAM



Louder Spotting

Pul Dn

REVISED 2-15-55 FOR L38

MULTI-PRODUCTS CO.

Model AF-67 TRANS-CITER

DATE - 9-26-1953

DRWN- G.E UNDY

182

MEMO FROM

George H. Goldstone

April 19, 1994

Lea:

For some reason, I can't seem to get caught up with the million and twenty things I'm trying to do at once. This seems to be the curse of all retired people who use their heads for something besides hat racks!

Finally revised my letter of March 9 to a form where I don't think my language slighted anybody. You are free to excerpt it as you wish. I really don't know whether ER readers want to know all these trivial details!

Also enclosing a nice photo of Gus Undy, W8YNC, taken at a Detroit ARA picnic a couple years ago. Sorry I don't have one of Bob Leland, W8GBT, also. I do have a copy of a thesis Bob wrote on SSB for his Master's degree at Wayne State University, which describes the design prototype for the ATR-4.* What you have is one of the production prototypes, of course. This is a bit over 100 pages, including pictures of the rig, called "SSB Penetrator". Would you like it? I can ship it with the W8YNC prototype of the AF-67. I still have some work I want to do on that rig - as the layer production type of lever switch arm doesn't fit Gus' prototype. I'll let you replace the missing 160 and 80 coils, as you will be able to match the number of turns exactl by counting those in your present model. The coil stock will be packed with the rig.

73 for now -

George

* This is not quite accurate!

W4AFM

Southern Appalachian Radio Museum, Inc.
PO Box 249
Leicester, North Carolina 28748
828-683-4251

Dear QCWA Member:

This is just a friendly note to make you aware of a project that members of Chapter 145 in Asheville, North Carolina have been working on for quite a while – an ANTIQUE RADIO MUSEUM. We call it - The Southern Appalachian Radio Museum and it is located on the campus of Asheville-Buncombe Technical Community College, near downtown Asheville. We are incorporated in the state of North Carolina as a non-profit organization and have IRS authorization under the provisions of paragraph 501/C (3) to provide for tax-deductible donations to the Museum, either in equipment or financial contributions.

The Museum is relatively new, having only been in existence for about a year and a half. We have made substantial progress in acquiring equipment for our displays which now include items such as a 1918 Spark Gap Receiver, several Atwater-Kent radios, various other AM/SW radios from the 1930's through the 1960's. We have also collected a lot of ham equipment by Ameco, B & W, Clegg, Drake, Galaxy, Gonset, Hallicrafters, Hammarlund, Harvey Wells, Heathkit, Morrow, Multi-Elmac, National, RME, Swan, Ten-Tec and others. We recently obtained a "mobile" transmitter by RCA used by law enforcement from 1936 in excellent condition….it weighs 65 pounds.

We have a club station on the air from the Museum using the callsign W4AFM. Some of you may recognize this call as belonging to the late Bill Hayes, who passed away last year. His family graciously allowed us to apply for his callsign. We are very pleased to be able to honor him for his many years of service to the amateur radio community, and his close association with our project.

We have obtained financial support for the Museum project from the ARRL Foundation in the form of a matching funds grant in the amount of $10,000. However, since it is a matching funds arrangement, we need the help of anyone interested in preserving the history of radio/electronics. The initial grant gave us only $1,000 cash and we need to raise $9,000 to obtain the balance of the grant. Through the generosity of many friends, we have raised a large part of that amount but we still need more by December (deadline for applying for the remaining $9,000).

Unfortunately, donated equipment cannot be considered for the purposes of this grant – we need either cash donations, or pledges of financial support. We still solicit equipment for the Museum, we just cannot use it for the grant. And, please remember that ANY donation to the Museum project, equipment or financial, is tax-deductible.

Would you consider being a supporter of this very worthwhile project? We don't ask for any specific amount, every dollar counts at this point. I am including a stamped, self-addressed envelope for your convenience in responding. Even if you are unable to help us financially at this time, we would appreciate hearing from you. We welcome you to visit us at the Museum and I am also enclosing one of our brochures which includes more information, including a map, and how to contact us. At present, we have the Museum open for visitors on Wednesdays from 1 to 4 PM. If that is not convenient for you, you may contact one of those listed on the brochure to arrange a day/time to suit your schedule.

Thank you for your time in reading this and we look forward to hearing from you.

Very 73,

Carl E. Smith, N4AA
President, QCWA Chapter # 145
President, The Southern Appalachian Radio Museum, Inc.

Web Site: www.Saradiomuseum.org

GEORGE H. GOLDSTONE
ATTORNEY AND COUNSELLOR AT LAW

1010 BURNHAM ROAD
BLOOMFIELD HILLS, MICHIGAN 48304
(313) 642-7673

March 9, 1994

Lea Salter KN4JW
400 Christopher Rd.
Campobello, SC 29322

Dear Lea:

Quite some time ago, you talked to me about MULTI-ELMAC equipment, and an ATR-4 SSB Transceiver prototype, which I then owned. I sold it (in a weak moment) to a ham operator who just had to have it for his collection. I believe he later sold it to you, so I know it is now in good hands! In fact, I believe it is the one pictured in ELECTRIC RADIO for July, 1992, accompanying your article on MULTI-ELMAC equipment and the Multi-Products Company.

I have intended for some time to write you, with more details of MULTI-ELMAC. There were a few small errors that could be cleared up, although the article was very interesting, and a story worth telling.

Multi-Products Company - which hams always called "ELMAC" - was a spin-off from Weltronic, Inc., a manufacturer of welding equipment controls that catered largely to the automobile industry and its suppliers. It was founded and owned in its entirety by the late Cletus ("Clete") Collom. Its engineering staff included Gustav E. Undy ("Gus", W8YNC), whose wife was a sister of Mable Collom, Clete's wife. When it became evident that there was a good market for radio controls for garage door openers, Multi-Products Company was formed. All the stock stayed in the family; Mable Collom owned a majority of the shares, and the other stockholders were Jack Bourassa, Phillip Cummings, Gervase (Jerry) McKeon, and Gus Undy. Bourassa was president of the company; Cummings was Treasurer; McKeon was Production Manager; and Gus Undy was Chief Engineer. All four were related by marriage to Clete Collom and his wife, Mable. They were a warm, friendly group. The business did well, primarily because Gus Undy had invented a patented circuit which used discrete audio frequencies to frequency modulate the RF carrier used in their radio controls. Initially,these operated in the 11 meter band. Besides their principal use in controlling garage door openers, they were also used to control factory doors and gates, and even railway crossing signals inside factory yards. At a later date, they were incorporated into security and alarm systems of various sorts. The company did NOT then make marine radios; that came much later.

While their plant was located in a small shop in Hazel Park, Michigan, Gus Undy designed a mobile transmitter for his personal use. This was actually the design prototype

W4AFM

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for the A-54. Two of Gus' friends were Jerry Richards, W8VQD, and George Wilde, W8CYL. Jerry was a manufacturers' representative for a welding products company, and was acquainted with Clete Collom. Both Jerry and George were convinced that Gus' transmitter would have a good amateur radio market, as no other ham mobile rig then included a VFO. Also, it was considerably smaller than the Harvey-Wells TBS-50, (then the mobile rig of choice), which had no internal VFO.

In 1951, after a long discussion, Jack Bourassa agreed that the company would build 10 production prototypes of what was to be called the A-54. These used many off-the-shelf parts, such as a dial made by National, a stock 2" Simpson meter, etc. I was not then Multi-Products Company's legal counsel, but was one of the group urging production of the transmitter.

Since I was driving to Seattle to attend that year's National A.R.R.L. convention, it was decided to install one of the 10 A-54's in my Buick, and get it some exposure in Seattle. I spoke to my friend, Leo Meyerson, owner of World Radio Labs, in Council Bluffs, Iowa, about this new mobile rig about to be put on the market, asking if it could be displayed in his convention exhibit. Leo - who was then the country's largest ham radio mail order dealer - agreed at once. I recall that when I described the rig, he said, "George, when can they make deliveries, and what are my discounts?" You can imagine my reaction; here I was, simply a friend of the principals at Multi-Products - generating sales of a new but market-viable product!

Seattle was more fun than I can describe. I parked my car, with the A-54 in it, right outside the front door of the convention hotel - where everybody looked inside at this new rig. (A little grease to the doorman took care of this spot!) At that time, 75 meter mobile was the "big" item, along with 10 meter mobile for Civil Defense work. Gus flew out from Detroit, bringing another prototype A-54, which Leo featured in his exhibit. When the convention exhibit area opened, there was a big crowd around World Radio Labs' booth, all looking over this new mobile rig. Other dealers were there, too, and they were referred to me by Leo when they asked him how they could order the rig. Mind you, this was before the rig went into production! By the time I got back to Detroit, I was getting phone calls from Bill Harrison (Harrison Radio, in New York) and others about the A-54. I considered it some sort of a marketing triumph!

In describing the PMR-6 manual, you said that "The manual for this receiver is very good" - and spoke favorably of the details it included. Lea, I wrote that manual! Gus was not satisfied with the A-54 manual, written by a local Bell Telephone type. When I concurred with his opinion, Gus asked me, "Would you like to write the manual for our new receiver?" (The design of which he had about completed). I

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said I would - and I did. The layout of the manual copied the subdivisions of a typical military equipment manual, with which I was more than familiar. Its style was used in all later MULTI-ELMAC manuals, a great source of satisfaction to me.

ELMAC did not have a dealer organization. I suggested that they sell only to Collins Radio dealers, who had been carefully screened by Collins. When that suggestion was followed, I told Dick Bellew, Collins' amateur radio sales manager, that ELMAC was restricting its sales outlets to Collins dealers. Dick - another personal friend of mine - was very pleased -- and inevitably, he told Collins dealers about this new product! Most of them took on the ELMAC line. (At that time, Collins was not manufacturing any mobile rigs. The KWM-1 came much later).

The AF-67 was designed by Gus Undy; you will see his name in the title block of the circuit diagram, dated September 26, 1953. I now have Gus' original production prototype of that rig, which I am about to restore. (Or is this something you want for your Multi-Elmac collection?)

I do not remember when Jack Bourassa died; but upon his death, Gus Undy was elected president of the company. Bob Leland, W8GBT, was made Chief Engineer. Bob had been working to a considerable extent on new variations of the patented Undy circuit for radio controls, and even patented a unique clam-shell case for the radio control transmitter! Bob, like Gus, was a brilliant engineer. It was Bob who designed the ATR-4 circuit, not Angelo Diamontoni. "Angie" - as we all call him - started working for Multi-Elmac after graduating from high school. He had remarkable talent in the mechanical design of radio equipment - and as I recall, he was charged with putting Bob Leland's concepts into physical form. The clean lines and layout of the ATR-4 were a demonstration of Angelo's ability. The ATR-4's dial assembly is, I think, as smooth a dial as I have ever encountered. It can be compared with German and Japanese products, and will come out ahead. Your article in ELECTRIC RADIO seemed to confirm that.

It should be mentioned, perhaps, that the name "MULTI-ELMAC" was adopted after Eitel-McCullough objected to use of "ELMAC" standing alone as too similar to their trademark, "EIMAC".

George Wilde, W8CYL, served for a while as Sales Manager for Multi-Products. During his tenure in that office, the company developed several marine products: a marine radio sold under the name "SEA-RAD"; a gasoline vapor detector called "SEA-FUME"; and a depth finder called "SEE-DEEP". These lines, although well-received, were abandoned due to the high cost of sales development in competition with Raytheon, Jefferson-Travis, and other established manufacturers of marine electronics. A further reason, which

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ultimately led to dropping everything but radio controls, was that it was more economic to devote a production line to the controls (where Multi-Products Company was already an industry leader) than to use that same production line for products where a market had to be developed. George, W8CYL, was made General Manager of the company's Canadian operation in Windsor, Ontario (across the river from Detroit), which post he held until he retired.

I had heard the story about Bob Drake visiting the Multi-Products Co. plant (then in Oak Park, Michigan) and his examining the prototype ATR-4. Supposedly he adopted one of its features - crystal pre-mixing - in his TR-3 design. The TR-3 came out at $495, I believe, and that is what killed the ATR-4 project. Multi-Elmac had hoped to sell the ATR-4 for just under $1,000; but the TR-3 pre-empted the competition! The Hallicrafters SR-160 was also pushed from the market by the low-price of the TR-3.

Multi-Products had also entered the CB market, and had a good position there using the trade name "Citi-fone", which had earlier been applied to a 450 mHz transceiver of Gus Undy's design; a product which never took off. The name "Citi-fone" was applied to a new 5-channel CB unit, which sold well. Later, the Citi-fone Model SS was regarded as the Cadillac of CB sets at the time. They left this market because of rising production costs, and the influx of Japanese produced units. They did design a tiny transverter (to be used with the auto radio BC set), which was to be produced in Japan; but that project was dropped along with the entire CB line.

Management finally decided that the most profitable part of their business was the original product - a radio control that would make or break a circuit. In the area of garage doors openers, there are 3 major components: The garage door; the mechanical operator ; and the radio control. The Stanley Works already owned Overhead Door Co., a manufacturer of the doors, as well as Vemco, Inc., a manufacturer of the mechanical operators. Multi-Products Co. was selling Vemco its radio controls - so it was a logical step for Stanley to integrate its business by buying Multi-Products Co. This was accomplished by merging Multi-Products into Stanley Works. The company now operates as Stanley Electronics, a division of The Stanley Works, with its plant in Novi, Michigan, northwest of Detroit.

Gus Undy lives in Michigan during the summer, and in Mesa, Arizona, during the winter. All the other officers of Multi-Products are deceased, as are George Wilde and Bob Leland. I am in contact with Gus, W8YNC, and talk to Angie, W8ERN, every now and then. He has a successful manufacturer's representative business and has a fine family (including grandchildren!). I still think of him as an enthusiastic high school kid, knee-deep in ham radio! He would be a fine role model for a lot of young people.

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Getting back to the ATR-4: I had excellent luck with it. It ran hot (like all the prototypes) and could have used a small muffin fan for cooling. I think the perforated steel cover did not allow enough hot air to escape by convection. Despite that, drift was not bad at all. The worst problem I had was in operation of the two control relays. I believe these were operated in tandem by the 6146 cathode current, which had to be carefully adjusted (on the rear chassis apron). I used it mainly as a mobile rig - and my best DX was a fantastic QSO one morning at daybreak, when I had a call on 3.9 mHz from VR4DX on the island of Guadacanal! Yes, I have the QSL to prove it! That surpassed my QSO on 10 meters using my AF-67 with ZE1JK in Southern Rhodesia in 1958.

The AF-67 I just acquired has been identified by Gus Undy as his prototype. He always applied serial No. 100 to his prototypes, so he told me - and that is its number! The 160 and 80 meter coils are missing, but I have B&W coil stock to replace them. I must find a piece of that brass timing chain that operates the band-switch; the present chain is broken. Know any source?

This letter has been long delayed; I had been wanting to write you for some time to make your history of the company more complete. I hope I haven't bored you!

73,

George

GHG/g

GEORGE H. GOLDSTONE
W 8 A P

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